

EDITORIAL ARTICLES.

TUBERCULOUS SURGICAL AFFECTIONS.—VOLKMANN'S CLINICAL OBSERVATIONS.

At the Congress of German Surgeons, held in May last, the subject of Tuberculous Surgical Affections was introduced by a communication of some length from Professor R. Volkmann, the Director of the University Clinic at Halle. This paper has since been published in a supplement to the *Centralblatt f. Chirurgie*, 1885, No. 24.

In pursuance of the plan adopted in the early part of the present year to gather and digest for the readers of the ANNALS OF SURGERY, the more important contributions on this subject which current surgical literature may contain (Vid. Vol. I., pp. 233, 273, 284, 466; Vol. II., p. 71), this paper also is now presented. A special importance attaches to it, because of the extent and variety of the experiences which it covers, and the continuity of the observations recorded since they have been observed and recorded under identical conditions and the inspiration of a single mind. The paper is introduced by the observation that there are two classes of facts and experience which, at the present day, determine the views of the great mass of physicians as to the clinical character and clinical significance of tuberculosis.

First. The almost regularly fatal termination, or the dangers at least enormous, of tubercular disease of internal organs, especially the lungs, larynx and intestines. The theory of tuberculosis has been developed from experience with pulmonary consumption. Even now it is difficult for many physicians, in case of an individual suffering from any tubercular affection, not to immediately think of a probably existing or prospective lung tuberculosis.

Second. The general conviction that tuberculosis is really an infectious disease, that inoculation and direct injection of tubercular mate-

rial into the blood produces general miliary tuberculosis, and that the undoubted bearer of the virus is found in the tubercular bacillus.

But the experience which clinicians trusted with the so-called nobler organs have the opportunity of making does not apply to disease—caused by the like poison—of organs, parts and tissues which toward this poison are differently and physiologically far better circumstanced, and which, for the preservation of the organic whole, are of no direct account. It is, therefore, not astonishing if the experience of physicians and surgeons does not coincide in many points.

Inoculation with tubercular material or with pure cultures of its bacillus, as well as the direct introduction of the same into the blood, have indeed contributed greatly to our understanding of the processes in acute general miliary tuberculosis, but they have not been able to produce local processes identical with tubercular, even anatomically, not to mention their clinical course. Tubercular disease of the various organs and localities leads, in only a relatively small quota of cases, to general infection, and then rather accidentally in consequence of specially unfavorable local conditions, and often after a long period during which the process preserves a local character. To apply conclusions and experience derived from inoculation and general miliary tuberculosis, without reserve to localized tubercular trouble, is inadmissible. All the more important under these circumstances appears the fact that through the investigations of the last fifteen years the terrain of the tubercular diseases with which the surgeon has to do has been so enormously extended—in that a great number of diseases with which he has daily to deal have been recognized as tubercular. The surgeon has almost more to do with this affection than the physician, and the position of surgeons for the study and treatment of tuberculosis is by far the most favorable. We not only have the diseased organs directly before our eyes, but we cut into the tubercular tissues and inspect them. We are often able to expose the whole depot and even its immediate vicinity. In the present status of our knowledge and needs many of our operations are to be considered as autopsies *in vivo*. We remove the tubercular tissues, or even whole organs, and examine them while the patient lives on and is observed further. We are in condition to apply physical, chemical and thermic means—remedies of every kind

—directly to the said tissues and observe their effects. A great number of questions regarding this, one of the most important diseases of mankind, will, in the near future, have to be solved by the surgeon.

After these introductory observations, the paper proceeds to discuss, seriatim, tubercular diseases of the various tissues and organs, and concludes with certain general considerations. The propositions of the author are as follows:

TUBERCULAR DISEASES OF THE VARIOUS TISSUES AND ORGANS.

1. *Tuberculosis of the Integument and Cellular Tissue.*—1. Lupus is a genuine tuberculosis of the skin, though it is to be considered as a special form, and occurs more frequently in individuals not hereditarily burdened. It is clinically distinguished by its great tendency to local relapse—in opposition to other forms of skin tuberculosis, into which latter lupus may pass. Prognosis in these changed forms is more favorable as regards permanent local cure, less so as regards later appearance of equivalent tubercular process in other parts, tissues and organs.

2. The tubercular ulcerations of the skin, distinguishable from lupus, correspond largely to the scrofular ulcerations of former writers. They occur principally in children and young persons, but are not overfrequent if we exclude cases developing secondary to tubercular abscesses of lymphatic glands, and tubercular joint and bone fistulæ. They are, almost without exception, curable by surgical methods, without local relapse.

3. Primary tuberculosis and primary tubercular abscesses arising therefrom, of deeper connective tissue, viz., intermuscular, parossal and para-articular layers, are very infrequent and to be diagnosticated only with great caution. In the great majority of cases such abscesses are connected with specific affections—forming the primary trouble—of bone, joint or lymph gland. The present treatment of these abscesses by free incision and scraping permits the easy recognition of such connection; when it is not demonstrable on the operating table it is not to be forgotten that tubercular foci—especially in bones—from which the apparently primary tubercloses of the cellular tissue arise, are often small and easily overlooked; further, that the abscesses not rarely appear so late that, meanwhile, the causal osseous affection has healed up. This holds

especially in the cold abscesses (congestion abscesses?) of spondylitis. In favorable cases it is possible by free incision, antiseptic injections and drainage with compression for a few days, to permanently cure by a kind of primary union. Of fifty-seven cases of spondylitis with gibbus, in the last few years, twenty-three were thus cured. This proves that no more pus or debris from the tubercular tissue was supplied to the abscess.

4. As a primary disease tuberculosis of the cellular tissue occurs especially in the panniculus adiposus of small children. Either at the same time or in rapid succession, a number of firm, flat nodules (gommes tuberculeuses) form under the skin. These soften; the skin usually becomes involved and bluish-red in color, and fluctuation increases until it breaks. This has for a series of years been characterized in lectures as the *furuncular form of skin and connective tissue tuberculosis*. Early incision with discharge of pus, of the large chunks of cheesy and necrotic connective tissue not rarely present, as well as of the fungous granulations attached to the abscess walls effect speedy cure without local relapse. True, the process sometimes spreads from single nodules deeper down instead of towards the skin, and large tubercular abscesses arise beneath the unchanged integument. This is positively a form of tubercular connective-tissue abscess which has no connection either with diseased bone, joints, tendon-sheaths or lymphatic glands.

5. Tubercular abscesses, whether they represent primary forms from the connective tissue, or are connected in the repeatedly-mentioned manner with joint or bone affections, are, after existing sometime, lined with a peculiar violet-gray or yellow-gray opaque membrane. This may attain a thickness of several millimetres. It is relatively nonvascular, especially in its inner layers in contact with tubercular pus, and contains an innumerable mass of miliary tubercles, so that it not rarely appears to consist wholly of them. This abscess-membrane can be easily wiped, scraped or prepared from the subtissues, often in inch-square pieces. The tissues beneath are, beyond a slight reactive induration, perfectly healthy. As good as never do diffuse tubercular eruption and cheesy infiltration extend into these neighboring tissues. In certainly over a thousand such cases freely laid open and examined in

the living subject, I have but twice observed a diffused penetration of the tuberculosis into the muscles forming in them the abscess-walls.

Where, in opening abscesses with cheesy contents, diffuse caseation of the muscle structure is met with, it usually depends on syphilis and cheesy-softened gummata. The diseased tissues here offer great resistance to the sharp curette, and can not be easily rubbed off, or even with a deal of force be separated clean off. The characteristic abscess-membrane is wanting. These two peculiarities assist also in recognition of actinomycotic foci penetrating muscles, and sometimes resembling tubercular abscess.

The characteristic membrane occurs only in tubercular abscesses, and is accordingly to be considered an absolute positive diagnostic criterion.

6. The class of non-tubercular chronic and so-called cold abscesses, occurring especially in the course of and after infectious diseases, must be defined by new investigations. In any case it is much smaller than that of the tubercular abscesses.

II. *Tubercular Affections of the Mucous Membranes Accessible to the Surgeon.*

7. Tuberculosis of the tongue. This occurs partly in form of sores, having some a torpid and some a fungous character, partly in form of penetrating nodules, which soften centrally. Solitary tubercular ulcerations of the tongue, with fungous vegetations and somewhat indurated surroundings are readily mistaken for cancer, especially in elderly individuals. I have twice made this diagnostic mistake myself, the error being determined by microscopical examination after extirpation. On the other hand the nodular form is often hardly to be distinguished at first from gummatous affections of the tongue. In its later course the cheesy-purulent melting away of the lump and transformation into a characteristic abscess, its manner of opening and the whole subsequent course of the disease, leaves no doubt as to its character and significance.

Of the patients operated on by me, partly by scarifying and application of thermocautery, partly by extirpation of a wedge from the tongue; the great majority died later of bone or lung tuberculosis. Some, however, have remained healthy for years, even when hereditarily handicapped.

Whether on the tongue there are tubercular processes classifiable as lupus is uncertain. At autopsies of persons dying of bone and lung phthisis I have twice found the entire lingual surface occupied by very flat, pin-head- to lentil-sized, confluent tubercular ulcerations between which lay characteristic little miliary nodules. The process had arisen during the last weeks of life and been considered aphthous.

8. Tuberculosis of the pharynx and palate I have seen almost exclusively in young persons—at puberty, or soon after. Flat, lentil-sized and larger, confluent sores with a yellow base, which extend out from the palate arch over the posterior pharyngeal wall and the entire posterior surface of the velum. Under strong illumination the miliary tubercles can usually be seen lying between the separate ulcerations. The affection may readily pass for congenital syphilis.

Extensive adhesions of the cicatricially contracted palatal folds, with complete or nearly complete closure of the pharynx from the nasal cavity, result more frequently from healed tubercular ulcerations than from syphilis. The latter in its severe forms produces rather defects in the palate; tuberculosis, on the contrary, more readily extensive ulcerating surfaces which, of course, favor later adhesion.

Energetic surgical treatment is more readily instituted and has a decidedly better prospect than in tuberculosis of the larynx. True, most patients, if not already having that trouble, die likewise from lung affections, but by early local treatment with caustics, the actual cautery, scraping out, etc., permanent cures do occur, and have been repeatedly observed by me.

9. There is an *ozæna tuberculosa*, depending on the formation of true tubercular sores in the nasal membrane and sharply separable from the infinitely more frequent, so-called scrofular rhinitis, dependent only on catarrhal conditions. Still more rarely does primary tuberculosis of the bony framework of the nose and upper jaw lead secondarily to infection and specific disease of the nasal membranes.

10. Twice have I seen severe tubercular ulceration (not lupus) of the lips. Once in a young girl with multiple tubercular deposits and healthy lungs; once in an old woman. The penetrating sore in the first case was remedied by a wedge incision; in the second the shallower ulceration, which had been mistreated by superficial cauterizations, was

covered with thick crusts, and surrounded by sclerotic connective tissue, was considered to be a cancer. Here excision and plastic operation were necessary.

11. *Fistula ani.* Some rectal fistulæ have from the start the significance of tubercular sores. The connection of rectal fistulæ and lung tuberculosis, so emphasized by the older surgeons, is hereby explained, or rather corrected. A tubercular rectal fistula is distinguished from a non specific one by its tendency to form large masses of fungous granulations, widespread separation of the mucous membrane and undermining of the external skin, as also sinuous abscesses.

Their treatment is, therefore, that of tubercular abscesses: Free opening, scraping off of fungous granulations, removal of thin edges of skin and mucous membrane; open treatment with antiseptic mull tampon, especially iodoform tampon. In rebellious cases, additionally, by cauterization with the hot iron.

12. Analogous to tubercular rectal fistulæ are the rare cases of insiduously developing perityphlitis occurring in otherwise healthy individuals, or who at least have presented no previous symptoms of intestinal tuberculosis, arising after the perforation of a single specific intestinal ulceration, and running in like manner to the formation of large tubercular abscesses, multiple fistulæ and extensive separation of the skin, and to the production of a mass of tubercular (fungous) granulations.

III. *Tuberculoses of the Uro-Genital Apparatus.*

13. Tuberculosis of the testicle, though principally observed in youthful or maturer manhood, occurs, however, even in the oldest. Besides, in old people there is simply suppurating, chronically progressive orchitis and epididymitis which is to be separated from the tubercular form. After tubercular disease of one testicle, the other is attacked later—sometimes not till years after. But even in the severest cases, where the epididymis is already caseated and destroyed, and the testicle itself permeated with the thickly-packed miliary tubercles; those in which ablation of the testicle is done not so very rarely remain for years perfectly healthy, and neither in the lungs nor in other organs acquire fresh tubercular deposits.

It is, therefore, desirable, especially in youthful subjects, to do castration as early as possible, before the spermatic cord is diseased, and

the process has reached the prostate and bladder, and not to delay long with partial resections, scrapings or cauterizations. In the case of old people in whom the affection runs a more benign course, such a conservative and expectant method is more to be recommended.

Resultant disease of the spermatic cord appears either as a uniform thickening or in the form of separate enlargements, shape of wheat grains, in the course of the vas deferens.

14. Tuberculosis of the bladder, ureters and kidneys present one of the most typical and severe of all tubercular affections. Even in cases where the process has remained localized to the bladder, cures can scarcely have been observed. The proof of tubercular bacilli in the urine admits early, positive diagnosis.

Whether, in tuberculosis of the renal pelvis and kidney, operative procedures, nephrotomy and nephrectomy, can be of real avail to the patient, is uncertain.

15. I lack sufficient experience of my own with tuberculosis of the vagina and uterus, and the treatment of this affection will doubtless fall chiefly to the gynaecologists.

16. Tuberculosis of the mamma is exceedingly rare, its clinical diagnosis possibly only in its later stages. Its therapeutics consist in amputation of the breast and clearing out of the axilla, since the axillary glands are apt to be infected early. It is important to know that chronic indurative (not abscedizing) mastitis sometimes leads to enlargement of glands in the axilla, which later becomes tubercular, and grows to fist-sized, cheesy glandular convolutions, without the mamma itself having become tubercular.

IV. *Tuberculosis of the Bones, Joints and Tendon-Sheaths.*

17. Everything heretofore denominated caries of bone, pædarthrocace, spina ventosa, scrofulous inflammation of bones and joints, tumor albus, fungus articuli, strumous joint affections and, most recently, after Billroth, fungous inflammation of bones and joints, belongs, with the rarest exceptions, to genuine tuberculosis.

18. Besides tuberculosis, a row of other infectious diseases are to be considered as ætiological factors in the development of chronic bone and joint suppuration, most of which, however, set in acutely and become chronic in their farther course. Infectious osteomyelitis, the

most frequent of these, often leading to suppuration of the joint and destruction of its articular cartilage—furnishes such a characteristic clinical picture, even when not beginning quite acute and with fulminant symptoms, that diagnostic difficulties can arise, if at all, only in the rarer form of osteomyelitis epiphysaria, or in localization of the process in the short bones.

The cases also of bone and joint suppuration from syphilis, acute articular rheumatism and septic infectious processes of every kind are for the most part readily distinguishable from the tubercular forms. Difficulties with regard to the determination of their character arise chiefly from the so-called metastatic joint inflammations after the acute exanthemata, when these have progressed to suppuration and destruction of the joint. Part of these cases have simply the significance of septic or pyæmic processes. In others it is undoubtedly tuberculosis, developing during the existence of the exanthem or immediately after, and often setting in very acutely. It is therefore questionable to what extent, in the acute exanthemata, suppurative and destructive articular inflammations occur that are actually produced by the specific (exanthematic) disease poison.

19. Tubercular inflammation of joints starts primarily, either in the bone or synovial membrane. The primary ossal form is considerably more frequent, especially in children. It begins with the formation of circumscribed tubercular foci in the bony epiphyses. These, as a rule, remain small, not exceeding the size of a pea or hazelnut. Diffuse cheesy infiltration of larger portions of the cancellous tissue are very rare. At the beginning, therefore, it is not at all an articular but an osseous trouble, and may remain such if softening and suppuration of the tubercular deposits does not occur, or if they open outside of, instead of, into the joint. At any rate, the simple osteopathic stage may continue indefinitely before specific disease dependent upon infection of the joint occurs. This does not happen until the products of the cheesy breaking down and tubercular bone-suppurative gets into the joint.

Tubercular deposits in the cancellous, especially in children, have a great tendency to mortify in toto and separate themselves as characteristic cheesy concretum-like sequestra. The process of demarcation thus occurring, evidently has a favorable action since it creates a barri-

er of granulations; true, its inner layers are uniformly found permeated with most abundant miliary tubercles, but this protects the adjacent bone from farther infection. Rarely do the cheesy sequestra and cheesy collections of pus in tubercular bone-cavities give rise to new (secondary) tubercular infiltration of the neighboring cancellous.

Multiple deposits (usually not exceeding two or three in number) frequently exist, partly in the same epiphysis, partly in both articular ends at the same time. They have a predilection for certain parts, *e. g.* the olecranon, the iliac portion of the acetabulum, etc., though this has not been established by exact statistical investigation.

20. The primary synovial form of the tubercular joint-inflammation occurs more in adults, particularly in elderly people. It shows a preference for certain joints, *e. g.* the knee. The miliary tubercles thickly occupying the synovial membrane develop either with or without very abundant vascular and granular proliferation. In the first case we have the common fungous form; in the second, torpid articular suppuration, denominated cold abscess of the joint by the older writers. The second form is oftener seen in elderly people, and seems to offer a particularly unfavorable prognosis.

21. Sometimes larger isolated tubercle-nodules form on the synovial membrane; they may grow to the size of an almond and even to a dove's egg, and project, pedunculated, into the joint. The remaining synovial membrane may, at the start, remain free; later it is usually occupied by the miliary process. Cure after extirpation of the nodule and temporary drainage of the joint is possible even in the last named cases.

22. It is an important question how far originally non-tubercular joint-inflammation may, in its later course, become so. At present this is proven only for the rarer cases of fibrinous synovitis with possible formation of rice bodies and for chronic dropsies with hyperplastic proliferation of fat-villi.

23. Tubercular joint-inflammations, whether starting primarily in synovial membrane or bone, do not necessarily produce suppuration of the joint or abscesses even in the severest forms (*caries sicca*), leading to extensive defects in the bone. Sometimes, however, a large

inroad of tubercles into the synovial tissue is followed by a free, watery exudation—hydrops tuberculosis.

24. Regarding the therapeutics of tubercular joint-inflammation, I hold that parenchymatous injections of tincture of iodine, carbolic acid, sublimate, arsenic, etc., have no results so far worth mentioning. Puncture of the joint with a coarse trocar, followed by disinfecting injections, is only effective in exceptional cases (hydrops tuberculosis, etc.)

The principal operative procedures to be considered are:

a. Incision (if possible, double incision) and drainage, with or without curretting the joint with the sharp scoop (arthrotomy).

b. Total extirpation of the joint capsule—after a large incision opening the joint as in exsection—with retention of the bony epiphyses and joint-cartilage (arthrectomy, respecting arthrectomia synovialis).

c. Resection of the joint, combined with extirpation of the articular capsule; retention of healthy portions of bone; frequently but a partial or, at least, atypic resection (arthrectomia ossalis et synovialis)

Retention of the much diseased “fungous” capsule—ample decapitation of the head of the femur or humerus—as formerly practiced, without complete and very exact denudation of the socket, is to be discarded.

As to the use of the sharp scoop, it should be borne in mind that with it the intermuscular peri-articular and subcutaneous abscesses connecting with the diseased joint or osseous foci, and lined by characteristic readily separable membrane, may be completely freed from all tubercular granulations, and further, that the sharp curette proves sufficient, even on bone, since the usually softened tissue can be scraped down to the cancellous; that, however, the like is not possible on tubercular degenerated synovial membrane. Here the granulations infiltrate the fibrous layers of the capsule, and no abscess membrane readily separable from the healthy tissues is present. Consequently, if the synovial membrane is very much diseased, relapses readily occur. When here the sharp scoop is used, operate with large incisions (which allow a full oversight) after constriction and follow up with exact antiseptic disinfection and aftertreatment.

25. Tuberculosis of the bones without participation of large joints is chiefly represented clinically by the following types:

a. Spina ventosa (pædarthroace), bottle-shaped enlargements of phalanxes of fingers and toes, also of the metacarpal and metatarsal bones, exceptionally also of the ulna and radius, or even tibia and femur; usually multiple, and dependent on a tubercular osteomyelitis. This affection develops only in the first years of childhood, and despite its multiplicity often heals without perforation, suppuration or formation of a sequester, so that no disturbance in the form or growth of the affected bones remains.

b. Tubercular suppuration and necrosis of the orbital portion of the upper maxilla with consequent characteristic ectropion of the lower lid, likewise preponderating in younger children.

c. Cold (tubercular) abscesses of the skull, dependent on small tubercular necrosis of cranial bones, usually penetrating the cranial cavity. Chiefly in adults.

d. Tubercular caries of the ribs; and, finally:

e. The common form of spondylitis (Pott's disease). Contrary to tradition in the compends, however, it would be much better to place this affection under tubercular joint-inflammation, since here the same unfavorable factors come into play, after the usually early occurring destruction of one or more inter-vertebral cartilages, as in the joints; the mobility of the separate segments towards each other, the burden of the body-weight, the progressive destruction of the inflamed osseous parts pressing together, and the coinfection of the same.

It is noticeable that in adults tuberculosis of the bones almost never attacks the shaft, and that here chronic osteitis and periostitis developing in the diaphysis is usually referable to other causes (syphilis, chronic form of infectious osteomyelitis).

26. Even the largest sinking abscesses coming from the bones and joints can be freely opened without danger in case it is done with all precautions of antiseptics and antiseptic aftertreatment. Early opening of such abscesses is desirable.

27. Wounds, after joint and bone operations for tuberculosis often become again tubercular before complete cure. Fistulæ and drain-cannals fill with "fungous granulations," united parts of the wounds open again, new tubercular abscesses form. Energetic treatment by renewed curetting, thermo-cauterization, free opening and, especially, tampon-

ade of the gaping completely cleansed wound with antiseptic mull (particularly iodoform and sublimate) is here to be recommended.

The latter procedure may perhaps be called the more effective, and in the severest cases may often be adopted at the start, after the first operation. I do not consider it advisable to overdo this principle of open treatment, since, according to experience, complete primary union is often achieved.

The principal thing is not to delay too long with an after operation, in case of tubercular relapse in the wound, lest the disease extend too far, and as soon as a new relapse appears to attack it again. Often four, six and more operations in intervals of a few weeks are necessary to diminish and limit the diseased focus and finally achieve complete and permanent cure.

28. It appears as if operating a joint or especially bone tuberculosis, sometimes, in consequence of the entrance of tubercular virus into the open lymphatics, gives rise to an acute general miliary tuberculosis (usually including basal meningitis).

29. As long as the disease-type, denominated by the ancients, tumor albus, arthrocace, Pott's disease, spina ventosa, etc., has been recognized, it has been known that even the severer cases, particularly in children, frequently recover spontaneously; and that individuals with limbs more or less impaired in motility and function, and with scars proving the extent and severity of the process, not rarely reach advanced age. Since all these troubles represent but forms of joint and bone tuberculosis, it is not at all necessary to discuss the possibility of a spontaneous cure of the same.

30. Tuberculosis of the tendon-sheaths occurs partly in the form of diffuse fungous disease in these structures, partly in that of solitary nodules (isolated tubercles). Since the said sheaths usually lie close to joints, we should take care, after fistulous perforation, not to mistake for joint and bone affections.

Therapy: Excision of diseased tendon-sheaths, curetting, etc.

V. Tuberculosis of Lymphatic Glands.

31. In all the tubercular affections so far considered the lymphatic glands that receive material from the affected region may become infected and tubercularized. This trouble, formerly called scrofular in-

flammation or cheesy degeneration, is genuine tuberculosis, yet the susceptibility to tubercular virus and the tendency to tubercular degeneration is very widely different in the glands of different parts of the body.

The cervical glands are by far the most readily affected, then the cubital; more rarely those in the axilla; most rarely the popliteal and inguinal. In the severest tubercular affections of the bones and joints of the foot, tuberculosis of the inguinal glands is but very exceptionally found.

32. In particular constitutional disposition (scrofula) and unfavorable heredity simply hyperplastic irritative and inflammatory glandular enlargements—such as consensually or sympathetically follow inflammatory and catarrhal processes of the skin and mucous membrane—become tubercular later. After removal of the causal affection, the glands do not reduce but enlarge, caseate and soften, and examination after extirpation shows genuine miliary and bacillary tuberculosis.

This process (scrofula of glands) is indeed most frequently observed after primary affections, which are themselves classed under scrofula, as, *e. g.*, glandular enlargements after cutaneous eruptions, chronic catarrhs, blenorrhœa, etc.

33. To what extent non-tubercular (non-bacillar) caseation of the lymphatic glands occurs has not yet been definitely settled.

34. Tubercular glands are best removed with the knife, and, where in a mass as usual, according to the same principles as with affected axillary glands in mammary cancer.

Scraping out softened tubercular glands with a spoon is not trustworthy, because the diseased capsule, at least, and generally also enlarged and affected neighboring glands, though not yet softened, remain, and occasion relapse. Still scraping out can not always be avoided.

35. Whether arsenic used internally is useful in tubercular (scrofular) tumors of the lymphatic glands must be determined by farther observation.

VI. *General Considerations.*

36. The tubercular character of an affection is not to be doubted; if

inoculation yields positive results, the tubercular bacillus is found, and anatomical examination demonstrates the known structural relations in the diseased tissues. All three conditions are fulfilled in the previously treated affections. On the contrary, it is not yet proven that tubercular tissue must invariably present the follicular arrangement.

37. Dissemination of tuberculosis results through various channels and in very different ways:

a. By the original focus growing.

b. By the tubercular virus (bacilli) penetrating from its original seat into the lymphatics. This probably very frequent, almost regular, course does not ordinarily lead to generalization, in that the glands not only retain the disease germs but also evidently destroy them in many cases. The significance of the lymphatic glands as a protective apparatus and filter in local infectious processes of every kind has not been sufficiently recognized. Even if the gland is infected and becomes highly tubercular, still generalization has a long road before it, since in case the virus gets beyond this it is again in glands higher up. Generalization does not occur until the last gland between the diseased part and the blood-current is overcome, or the thoracic duct itself is diseased.

c. By penetration of the poison from a neighboring tubercular deposit into a serous cavity; this may occur either from extension of the focus to lining of the cavity, or by rupture of the bacilli-containing products of suppuration and softening. Its farther distribution is brought about partly by the fluid in the respective cavity (synovia, exudation, etc.), partly by the gliding of the cavity-walls in functional movements of the adjacent parts. The danger here depends chiefly on the size and importance of the serous sac, the arrangements of its lymphatics, and further on the rapid transformation of the cavity wall into a layer of granulations (which has perhaps occurred previous to perforation) which constitutes an impassable barrier.

d. By the introduction in like manner of the tubercular virus, or products of suppuration and degeneration containing the same, into the canals and cavities lined with mucous membrane, in which the poison either stagnates or has to traverse a long distance before its excretion from the organism and the membrane of which it infects by

contact, occasioning new miliary eruptions. Certainly the most unfavorable case here is the bronchi-canalized lung, where the virus not only establishes new foci in the bronchi and their immediate vicinity, but infects the larynx and, swallowed as sputum, reaches the intestine, finally infecting it also.

e. By penetration of the poison from a near focus into a permeable, usually large, vessel, especially a vein, or into a lymphatic leading directly into the blood, whereupon generalization—acute general miliary tuberculosis forthwith follows. Tubercular disease of a vein-wall from an adjacent deposit is to be considered the most common cause of this process.

In considering the possibilities it is evident that tuberculosis of bone, skin, cellular tissue, joints and lymphatic glands present far less danger than that of the respiratory organs or intestinal tract. Fistula ani is so far more favorably situated that the infectious material is at least rapidly discharged; on the contrary, tuberculosis of the urinary passages is, as regards this danger, no more favorably situated than that of the lungs and intestines. Tuberculosis of the testicles can be successfully operated as long as the spermatic is not affected, etc.

38. Susceptibility to tubercular poison is, in man, limited to certain individuals, and even in these again to certain times and definite organs and tissues. From the frequency of tubercular disease of every kind in Northern Europe, every man must have often enough received tubercular poison, above all those who uninterruptedly associate with the tuberculous.

39. In the forms also with which the surgeon has to do, this susceptibility usually comes from hereditary want of resistance. Still the clinical material of hospitals and dispensaries is poorly adapted to statistical investigation of this matter, because patients from the poorer classes are usually able to give but little account even of their near relatives—not to mention the great circle of blood-relationship. The experienced, older physician who overlooks whole families will find that fungous arthritis, caries, tubercular lymph-adenoma, etc., do not generally occur in healthy families.

40. Tubercular disease often appears multiple, either:

a. Directly on the first reception of the poison it is deposited in sev-

eral places. The multiplicity of foci in spina ventosa is known. Herefore less notice has been taken of the acute invasion by multiple foci developing rapidly, one after another, in entirely different organs and tissues of previously perfectly healthy individuals, and occurring as well in children as in adults, and even elderly people. Those affected often succumb to such an attack; they may, however, outlive the storm and ever after remain healthy.

b. Or the tuberculosis appears multiple on repeated independent infection from outside. A person suffers from tuberculosis of the lymphatic glands in youth, has a tumor albus or arthrocace towards puberty, and dies from pulmonary consumption in the thirties. This is very common and can not appear astonishing, since the susceptibility to the said virus is not lessened by having withstood a tubercular infection. The persons in question possess, at least in the great majority of cases, an individually increased susceptibility to the poison, and this is about them everywhere.¹

41. There is, therefore, no reason in cases of multiple focal disease to consider the more recent as a secondary or ante-infection arising from the older localization, nor, as has repeatedly been done of late, to vindicate the metastatic character of tubercular joint and bone disease; so far this is only proven for the localization of acute general miliary tuberculosis. Auto-infection is limited to the cases noted in paragraph 37, *b* to *d*.

42. The operative removal of a tubercular deposit will, of course, make it impossible for an acute general miliary tuberculosis or the farther infection of lymphatic glands to arise from this point, but it does not prevent equivalent disease arising later in other places, and does not do away with the danger of later pulmonary tuberculosis. An in-

¹In practice, certainly, the two forms of multiplicity often can not be distinguished; and even their anatomical separation would often be very difficult, if the pronounced opinion of some authors and myself is correct, that the tubercular poison after its introduction into the body may remain a long time before it finds favorable conditions for development. Foci of apparently very different age and in very different stages of development might possibly then be attributable to one and the same infection. The theory of the metastatic character of focal tuberculosis (cf. following paragraph 41) would then lose even a sure anatomical foundation.

dividual who, *e. g.*, in youth had undergone amputation of the thigh for a tubercular knee-affection, remains even after his tenth or fifteenth year endangered, or at least the object of anxiety, because in him susceptibility to tubercular poison has been proven, and though not necessarily, yet possibly, still continues.

43. Local relapses after operations for tubercular disease, the wound becoming again fungous, etc., do not have their cause in the patient's constitution or in the tubercular or scrofulous diathesis, as is usually imagined; they are rather exclusively conditioned by the incompleteness of the operation, the fact that somewhere there remained tubercular tissue which afterwards increased and infected healthy granulations, tissues and cicatrices anew.

After amputation in perfectly healthy parts, relapses at the stump (a becoming fungous of the amputation-wound) do not occur, even in persons with advanced pulmonary tuberculosis. On the contrary, in such cases the dry tissues of the emaciated limbs heal very readily by primary union. It is therefore desirable, if amputation is performed, not to leave any fistulæ in the flaps.

I have never seen in a scrofulous child or in a tubercular person, even with manifest lung phthisis, the wound become fungous after amputation for trauma, extirpation of a lipoma, injury or tearing of the soft parts taking months to heal, complicated fractures, etc. I put the question: Has any one ever certainly observed such a course? The communication of such cases, exactly observed and investigated, would be of great importance.

44. Despite all this, the great majority of all tubercular bone and joint troubles are certainly traceable to causes; still, not to severe wounds and injuries, but to light wounds, contusions, distortions, which would have had no farther consequences in persons having no susceptibility to the tubercular poison.

That distortions of hand or foot frequently lead to tubercular joint and bone affections (caries) can not be disputed. Spondylitis, also, usually develops in children after a fall or tumble.

It must be assumed that after a severe trauma (subcutaneous fracture, large wounds, etc.) the energy of the reactive and reparative tissue proliferation is so considerable as not to allow the development of tu-

bercular germs, an hypothesis for the admissability of which the conduct of the lower organisms offers numerous analogies. On the other hand it would appear that light injuries, combined, perhaps, with extravasation into the cancellous, slight synovial exudation and, in any case, certain changes in the nutritive conditions of the affected tissue, furnish a favorable basis for the development of the tubercular bacillus.

45. Not without surgical significance is the question how far the said bacillus, of itself, causes suppuration, and to what extent softening and caseation of tubercular deposits, is favored by the access of septic material which finds a favorable bed in the dead tissues of just such foci.

The regularity of softening and ulceration in tuberculosis of the respiratory and of the intestinal tracts contrasts very noticeably with the extreme frequency with which bone and joint tuberculosis heals, or at least for long years exists, without suppuration. Older writers have often pointed out that high fever precipitated the softening in tubercles.

Not rarely quite acute suppuration, even with septic phenomena, appears in chronic tubercular bone or joint affection that long took a favorable course without any suppuration.

46. Tuberculosis shows the widest difference in children and adults as regards localization of the foci in the various organs, tissues and parts of the body; likewise in regard to curability and danger to life. A more exact statistical determination of these points is desirable.

Thus it is known that typical spina ventosa occurs only in small children, tuberculosis of the shoulder joint almost exclusively in adults; likewise the very torpid tubercular suppuration of the knee is almost always seen in adults.

Cure results far easier in children than in adults.

Tubercular troubles in children are very much more frequently recovered from without causing suppuration. The severest tubercular bone and joint suppuration, combined with most extensive destruction, may, in children, heal, even spontaneously. There is a large field here for conservative surgery; while in like cases in adults cure can only be achieved by removal of the diseased parts, and often enough only by amputation.

Tubercular joint and bone affections are more self-limiting in children. Diffuse suppuration of the entire carpus, so frequently occurring in adults, especially elderly people, is here hardly ever observed. If we do meet a rare case of suppurating tuberculosis of the wrist in a child, the process remains limited to the wrist-joint proper. All the cases in young children observed by me were cured by drainage, or where necessary, curetting. On the foot similar conditions prevail, though, perhaps, less sharply prominent. Prognosis becomes worse towards puberty, cases increase where conservative measures no longer suffice.

Local tubercular disease of other organs combines far more rarely in children than in adults with fatally progressing lung tuberculosis. In an older individual having, *e. g.*, caries of the wrist, it is exceptional that he does not have or is not soon attacked by pulmonary tuberculosis.

47. The dispute over the identity of tuberculosis and scrofulosis is not yet concluded. The first thing to be determined is what forms of milder so-called scrofulous affections are produced by the tubercular bacillus. In one case of eczema on the arm, that I believe any dermatologist would have diagnosticated as eczema, and which I had examined because of the existence of scrofulous softened cubital glands, tubercular bacilli were found in the scraped-off eczematous epidermis.

It would then have to be determined to what extent scrofula produces chronic inflammations, hyperplasia, and, in general, tissue changes furnishing a favorable nutritive basis for tubercular virus. Such a condition seems to be proven for the lymphatic glands.

Finally, it should not be overlooked that in this dispute, often the question at issue has not been formulated in a sufficiently logical manner. Under tuberculosis the local process is usually thought of; under scrofula, a certain constitutional or nutritive anomaly of an unknown nature, a special disposition, diathesis, hereditary handicap, which in a great part coincides with that assumed for tuberculosis.

A person who, on the closest examination of his organs, presents no deviation from normal, and not the least local change, is not called tubercular; but a child is called scrofulous who, though at the time blooming and perfectly healthy, has previously experienced a series of

affections classed as scrofula. Indeed, it would, perhaps, be called scrofulous, if some only of its brothers and sisters had suffered from scrofular affections and tuberculosis was at home in the family.

48. It is not to be doubted that certain medicaments applied locally to tubercular tissues exert a curative, perhaps even a specific, influence. The favorable influence of mercury preparations (blue ointment) on lupus, *e.g.*, is not to be questioned. Still the views are very divergent, and a farther continuous comparative testing of such remedies is highly desirable. Iodoform, iodine, arsenic, lactic acid, etc., besides the mercury preparations, are to be especially considered.

The above holds true in a still greater degree of the internal use of drugs.

WM. BROWNING.